VACUUM
EL SYSTEM

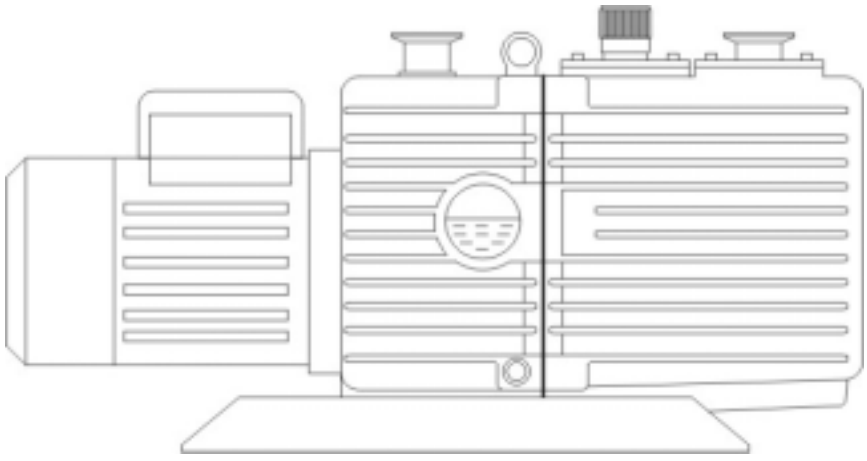
DIN EN ISO
9001:2000

Oil Rotary Vane Single-Stage Vacuum Pumps

Types

RSVP 15
RSVP 30
RSVP 60
RSVP 90

OPERATING INSTRUCTIONS



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Indications:

Warning: Indicates procedures that must be strictly observed to prevent hazards to persons.

Caution!

Indicates procedures that must strictly be observed to prevent damage to, or destruction of the equipment.

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*We recommend that you carefully read this user's manual before you begin operation of **RSVP** vacuum pump. We do not bear responsibility for accidents or damages, caused by or related to product exploitation, occurred due to non-observance of hereby instructions. Our responsibility constitutes a quality repair service in case of troubleshooting, and is limited within the value of the product.*

Figures:

The references to figures in the text, consist of two figures - the figure No and the position No, e.g. (1/3).

Service:

If a pump is returned to a service, indicate whether the pump is free of substances damaging to health or whether it is contaminated. If it is contaminated also indicate the nature of the hazard. Any pump, sent to a service without a **"Declaration of Contamination",** will be returned to the sender's address, on the account of the sender.

Disposal of waste oil

Anyone in possession of used oil is responsible for its proper disposal, in accordance with the local acting regulations.

Used oils coming from vacuum pumps must not be mixed with other substances.

Used oils from vacuum pumps (on the basis of mineral oils) having been affected by normal contamination due to oxygen from the ambient air, increases in temperature and mechanical wear, must be disposed of as used oil in accordance with the regulations.

Used oils from vacuum pumps that have been contaminated by other substances must be labelled, stored and disposed of as special waste with reference to the kind of contamination.

In many countries proof of where the oil has finally been left is required by Law and often shipping of such contaminated waste requires permission by the authorities.

When storing and disposing of used oil please observe the safety regulations that are valid in your country.

1. Description

RSVP pumps are oil-sealed rotary vane single-stage vacuum pumps. The number in the type designation (**RSVP 15, 30, 60 and 90**) indicates the pumping speed in m^3/h. They are highly productive at comparatively low weight and low energy cost. Application areas are metallurgy, mechanical engineering, power engineering, pharmaceutics, medicine equipment, chemical and light industry, in drying processes through sublimation and distillation, vacuum packing, vacuum casting, filtering, in vacuum chambers and ovens, production of electric bulbs, sterilization, vacuum forming, precise casting of details.

RSVP pumps can pump gases and vapours and evacuate vessels or vacuum systems in the fine vacuum range.

- Pumps are **not** suitable for pumping greater than atmospheric concentrations of oxygen, hazardous gases, or extremely aggressive or corrosive media.

RSVP pumps operate through means of three-phase electric motors, having different power, depending on the pumping speed.

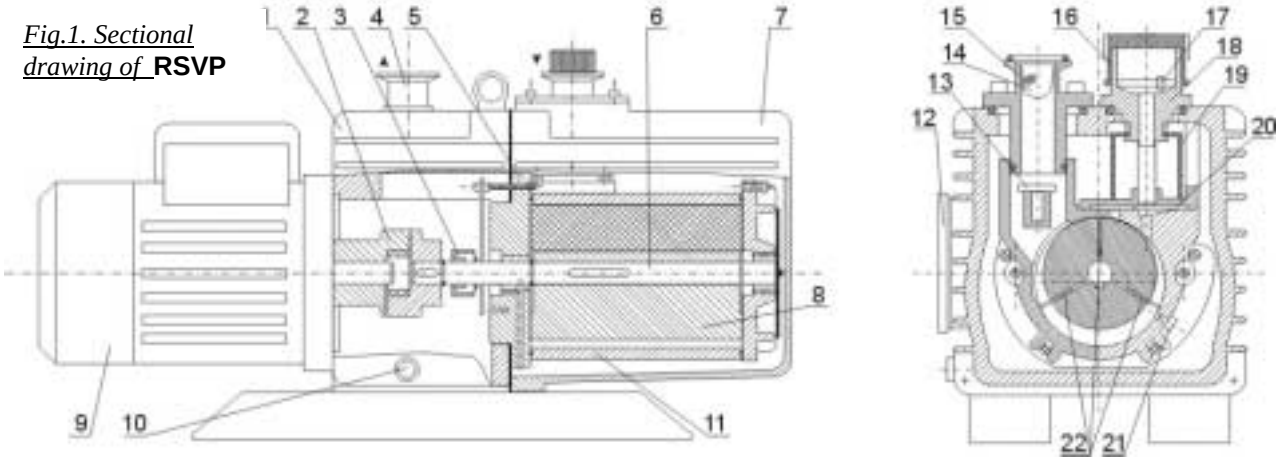
Caution!

- **RSVP 15** is also available with a single-phase motor.

The drive motor is directly flanged to the pump. The pump and motor shafts are directly connected by a flexible coupling. The bearing points of the pump module are lubricated sliding bearings. All connections are to be found at the top of the pump. The oil-level indicator is provided with a prism for better observation of the oil level.

The pump module consists of assembly parts which are pin-fitted so as to allow easy disassembly and reassembly.

Fig.1. Sectional drawing of **RSVP**



1 Coupling housing
2 Coupling
3 Centrifugal switch
4 Exhaust port
5 Front-end plate
6 Rotor Shaft
7 Oil reservoir
8 Rotor
9 Electrical motor
10 Oil-drain plug
11 Vacuum ring
12 Oil-sight gauge
13 Anti-suckback valve
14 Dust trap filter
15 Intake port
16 Gas ballast valve – knob
17 Valve plate
18 Gas ballast valve
19 Demister
20 Exhaust valve
21 Oil nozzle
22 Vanes

1.1 Function

In accordance with Fig.1, the rotor (1/8), mounted eccentrically in the vacuum ring (1/11), has three radially sliding vanes (1/22) which divide the vacuum stage of the pump chamber into several compartments. The volume of each compartment changes periodically with the rotation of the rotor.
As a result, gas is sucked in at the intake port (1/15). The gas passes through the dust trap filter (1/14), flows past the open anti-suckback valve (1/13) and then enters the pump chamber. In the pump chamber, the gas is passed on and compressed.The oil injected into the pump chamber is used for sealing and lubricating.

From the chamber of the vacuum stage, the compressed gas enters the pump oil reservoir, when certain pressure through the exhaust valve (1/20) has been obtained. The oil entrained in the gas is coarsely trapped in the internal demister (1/19); there the oil is also freed of mechanical impurities. The gas leaves the pump through the exhaust port (1/4).

During compression, a controlled amount of air – the so called gas ballast – can be allowed to enter the pump chamber by opening the gas ballast valve (1/18). The gas ballast stops condensation of vapours in the pump chamber up to the limit of the water vapour tolerance. The gas ballast valve is opened and closed by turning the gas ballast knob (1/16).

The oil is separated from the gas in the pump in two steps (phases). First, small droplets are coalesced into large drops. Then, the large drops fall into the oil reservoir as the exhaust gas is diverted by the inner walls of the oil case. Thus a low loss of oil is obtained. This and the large usable oil reservoir ensure long intervals between oil changes even at high intake pressures.

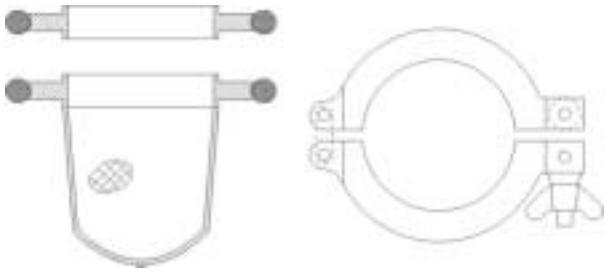
The vacuum in the operating media is maintained by an anti-suckback valve (1/13) which is controlled via the centrifugal switch (1/3). During operation of the pump the control piston and the valve disc of the anti-suckback valve are held at the lower position by their own weight (valve open).

When the pump stops (because it has been switched off or because of a failure), the air pressure pushes the control piston up. Thus a connection is provided between the pump chamber, the oil reservoir and the piston of the anti-suckback valve.

Air follows in, which vents the pump chamber and forces the valve disc (1/13) against its seat. This effectively prevents backstreaming of oil or oil vapours. The anti-suckback valve (1/13) operates independently of the operating mode of the pump, i.e. also with gas ballast.

1.2 Supplied Equipment

Standard equipment supplied includes:



Pump with motor, including initial filling of N 62 , HE-200 or Shell Corena V oil,
A set of connecting elements DN 25 KF, DN 40 KF or DN 50 KF, depending on the concrete pump,
1 centering “O”ring,
1 centering “O”ring with dirt trap,
2 clamping rings.

For protection during shipment, the connection ports are each wrapped separately and placed in the pump package.

Switches, motor protection switch, mains cable etc. are not included.

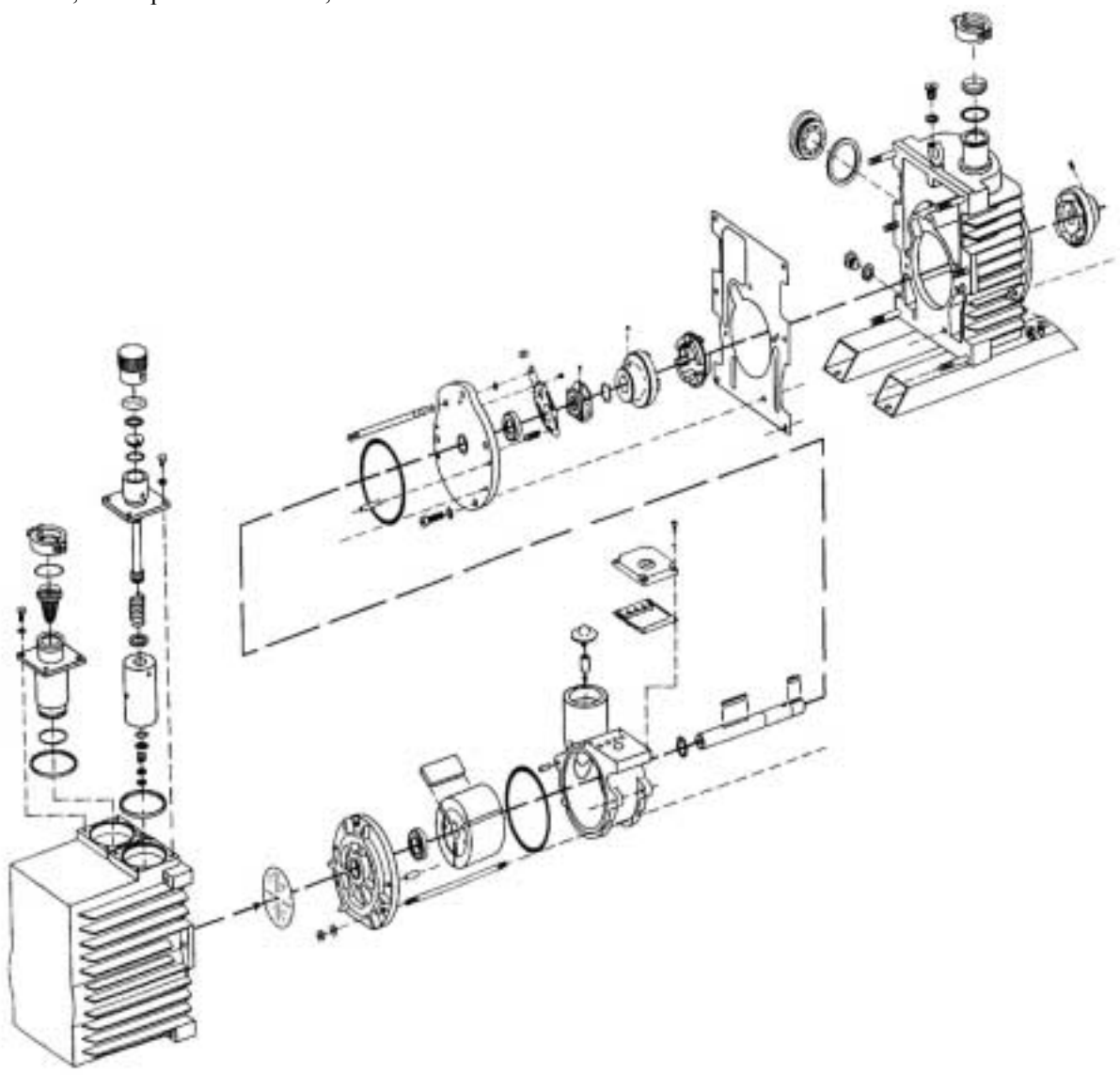


Fig.2 Detailed scheme of RSVP vacuum pump

1.3 Transportation

Caution!

- Pumps which are filled with operating oil must only be moved while standing in normal /operating/ position. Otherwise oil may escape. Avoid any other orientations during transport. Acceptable tilt degree - 15°.

• Check the pump for the presence of any oil leaks, since there exists the danger that someone may slip on spilt oil.

• When lifting the pump you must make use of the crane eyes provided on the pump for this purpose; also use the recommended type of lifting device.

1.4 Technical Data

Description	Measure	Model			
		RSVP 15	**RSVP 30**	**RSVP 60**	**RSVP 90**
Free Air Pumping *	m^3/h	19	38	76	114
Pumping Speed **	m^3/h	15	30	60	90
Ultimate remaining pressure *** - Gas-ballast – closed - Gas-ballast – open	 mbar mbar	 4×10^{-2} 8×10^{-1}	 $2{,}5 \times 10^{-2}$ $6{,}5 \times 10^{-1}$	 $2{,}5 \times 10^{-2}$ $6{,}5 \times 10^{-1}$	 4×10^{-2} 8×10^{-1}
Ultimate working pressure **** - Gas-ballast – closed - Gas-ballast - open	 mbar mbar	 $\leq 4 \times 10^{-2}$ $\leq 8 \times 10^{-1}$	 $\leq 4 \times 10^{-2}$ $\leq 6{,}5 \times 10^{-1}$	 $\leq 4 \times 10^{-2}$ $\leq 6{,}5 \times 10^{-1}$	 $\leq 4 \times 10^{-2}$ $\leq 8 \times 10^{-1}$
Incoming voltage (50Hz)		220V 1-PH 220V/380V 3-PH	220V/380V 3-PH	220V/380V 3-PH	220V/380V 3-PH
Electric motor power	kW	0.55	1.1	2.2	3.2
Nominal speed, rpm	min^{-1}	1500	1500	1500	1500
Noise level	DB(A)	58	60	66	68
Quantity of oil	l	1	2	2,8	4,1
Recommended oil		N62	N62	N62	N62
Tolerance of ambient temperature	°C	12~40	12~40	12~40	12~40
Input / Output type		NW 25/ NW 25	NW 40/ NW 40	NW 40/ NW 40	NW 50/ NW 40
Dimensions	mm	460(L) x 172(W) x 290(H)	510(L) x 242(W) x 365(H)	615(L) x 242(W) x 365(H)	755(L) x 242(W) x 450(H)
Weight	kg	26	65	70	98

* Theoretical pumping speed.

** Pumping speed in working media, measured at specific laboratory conditions – gas, pressure, temperature, etc. This speed is variable, depending on the real operation process.

*** Lowest values of pressure (with/without gas ballast), which can be obtained at specific laboratory conditions.

**** Operational pressure values (with/without gas ballast), obtainable in real conditions, in accordance with the pump operation instructions.

All measurements of vacuum pumps parameters are done in compliance with the factory instructions.

Fig.3 – Pumping speed characteristics of **RSVP** *vacuum pumps*

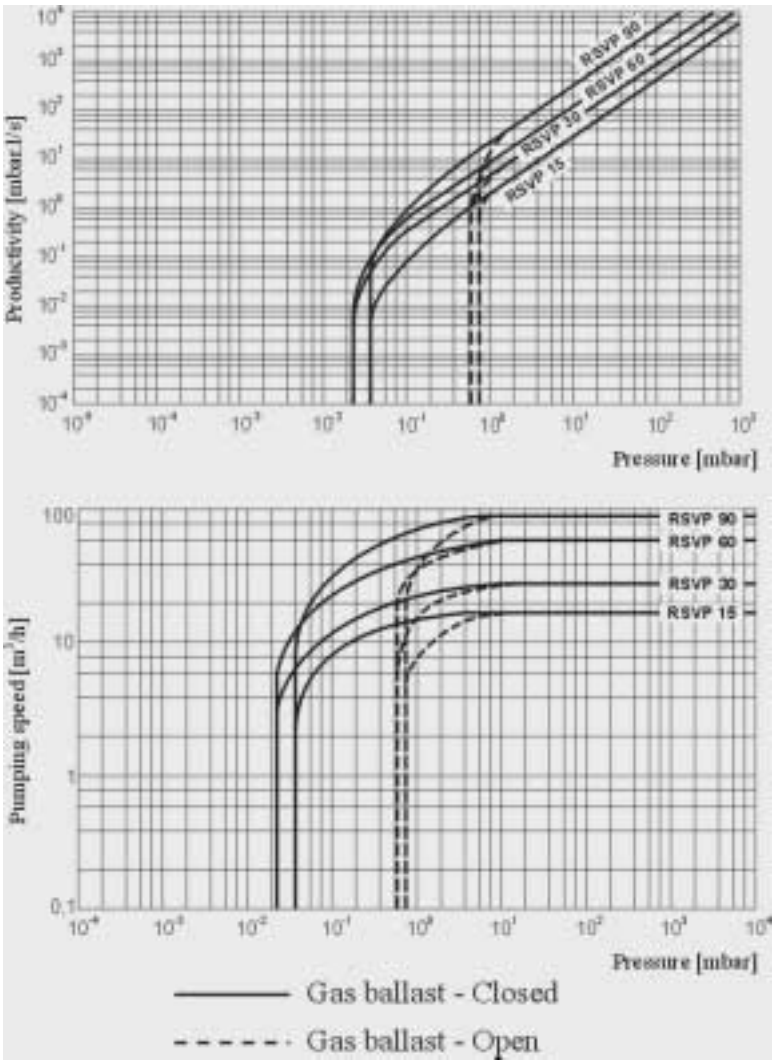


Fig. 4 – Dimensions of **RSVP 15**

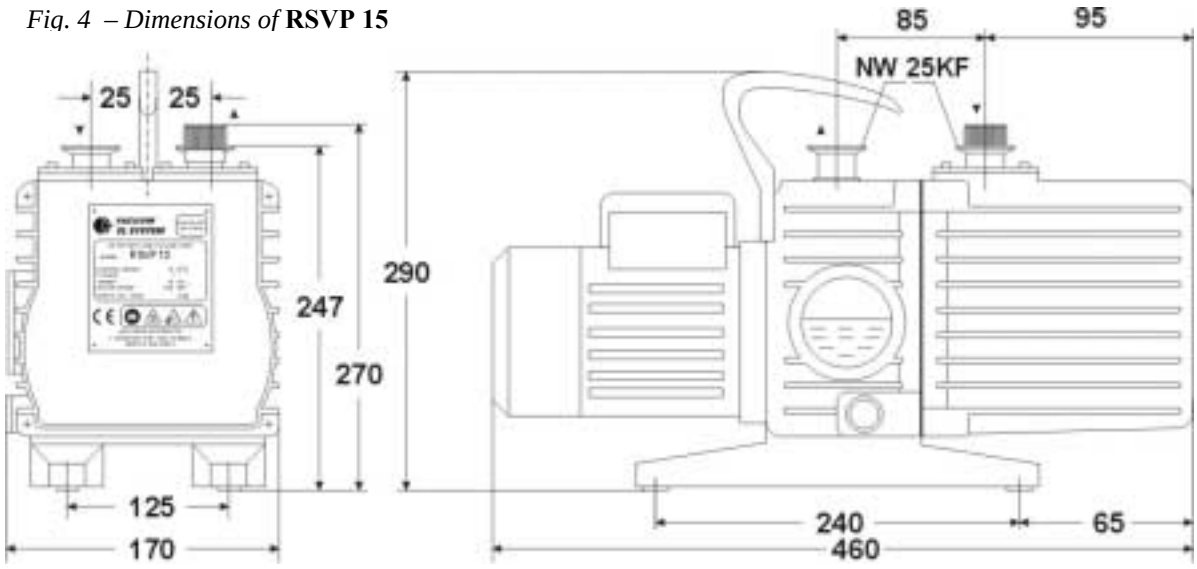


Fig. 5 –Dimensions of **RSVP 30 / RSVP 60**

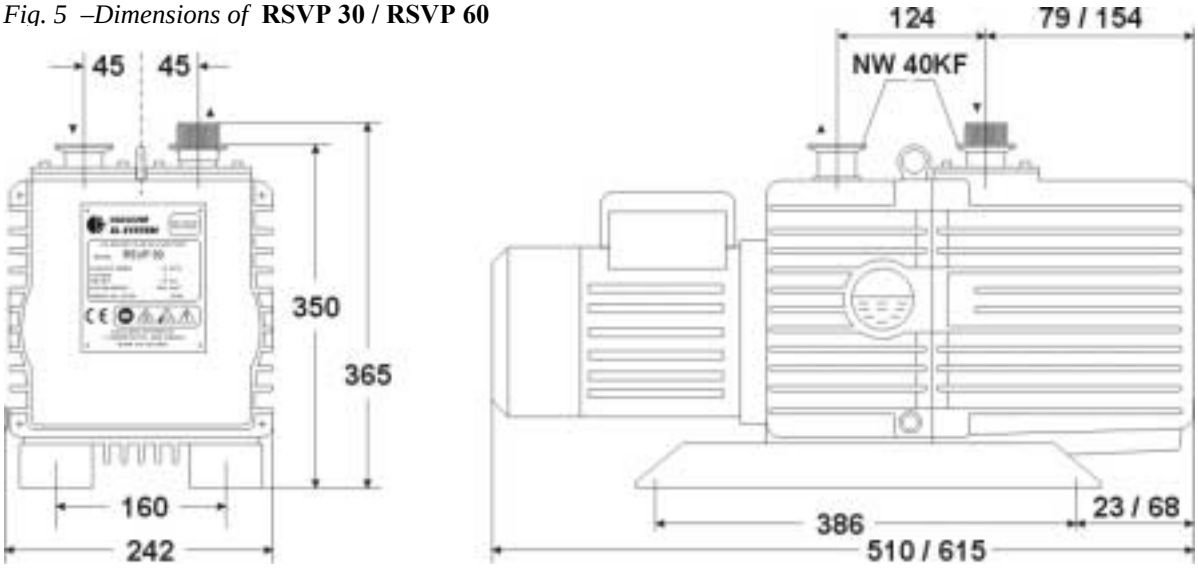
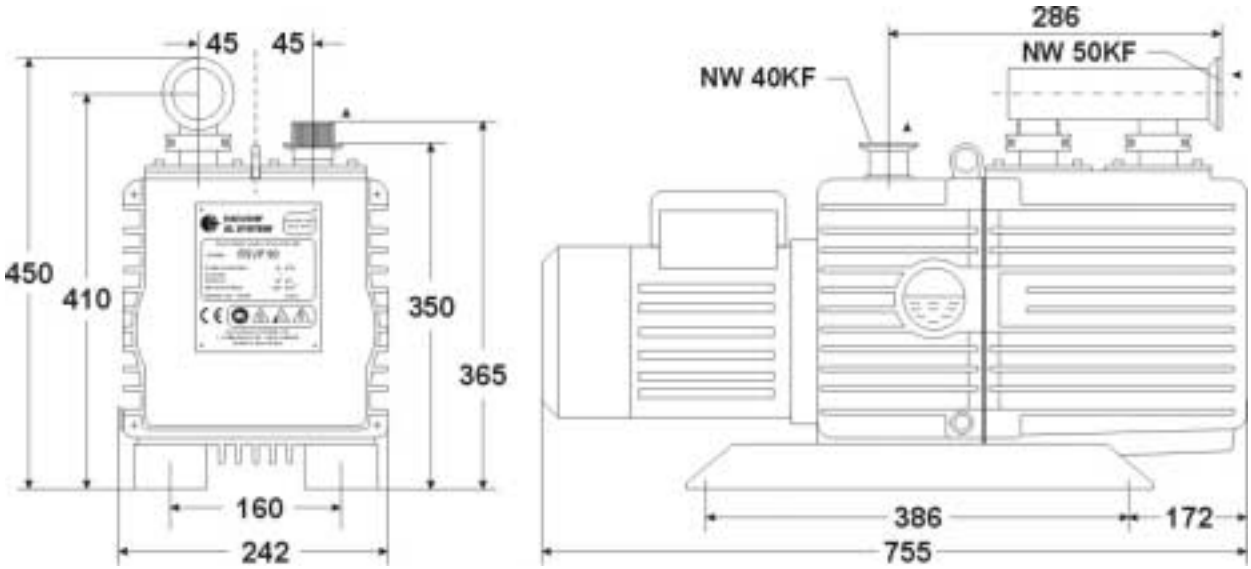


Fig. 6 – Dimensions of **RSVP 90**



2. Vacuum Safety

2.1 Vacuum Pumps / Vacuum System Hazards

Consider all possible chemical reactions within your system. Make allowance for abnormal chemical reactions, including those, which could occur under fault conditions.

Refer to material data sheets when you assess the potential hazards, associated with your process materials.

Use dilution techniques to minimize reactions with oxidants and flammable materials.

Use manufacturers recommendations for type of lubricant in your pump when you pump oxidants and pyrophoric materials.

When you perform safety calculations, ensure that the safe working pressure for all components in the system are taken into account.

Ensure that you incorporate the correct type of pressure relief devices and that they are suitably rated for your application.

If you pump hazardous materials, you must design the system to fail to a safe condition.

Leak test systems and equipment before use.

No part of the body should be exposed to vacuum. The exposure of small areas of the body surface to the suction of a pumping system can result in tissue damage.

Exhaust hazard – Any dangerous gas substances that may be present in the system being evacuated may pass through the system into the pump and be emitted at the exhaust. Suitable precautions must be taken.

2.2 Hazardous Overpressure

Hazardous pressures may be produced if the exhaust from an automatic pump is restricted or blocked, and care should be taken at all time to prevent this.

Exhaust line manifold systems should be designed to cope with the maximum exhaust load that can occur.

Hazardous pressures may be produced in the system to be evacuated if the rotary pump is operated in the reverse sense. When a rotary pump motor requires a three-phase electrical supply, the outfit should be checked for correct rotation after main connection, before being connected to the system to be evacuated.

2.3 Pump Oil Hazards

Cleaning hazard – Suitable precautions should be taken to protect personnel, engaged in cleaning vacuum pumps from the solvents being used and from the process debris in the pump. The exact precautions to be taken will be dependent on the cleaning solvent involved and the applied process, but particular attention should be paid to the danger of inhaling solvent vapours.

Oil mist hazard – Rotary pumps are oil-sealed and discharge small quantities of oil mist when operating. In poorly ventilated areas this can lead to unacceptable concentrations of oil-vapour. Oil vapour should be kept to a minimum. It is recommended that a suitable oil mist filter is fitted to the pump or, alternatively, the exhaust should be piped away externally.

Oils, based on mineral products are only slightly to moderately irritating to the skin and eyes. Prolonged exposure of the skin to mineral oils may give rise to dermatitis.

Care should, however, be taken to avoid inhalation of vapours or mists, arising from undue heating or excessive mist generation. In the case of fluorinated compounds (e.g. Fomblin), avoid contact with excessive heat (280^{o} C), e.g. lighted cigarettes, heater elements, etc.

Oil fluid spillage should be absorbed with sand, earth or mineral absorbent and disposed of in the proper manner. In the event of large spillage, steps should be taken to prevent possible pollutions.

The operating temperature of the vacuum oils should be in the order of safe operating conditions in a vacuum environment.

A hazardous condition may occur if the oil is permitted to overheat excessively (self-ignition, chemical decomposition and emission of dangerous components, etc.).

3. Operation

3.1 Unpacking of The Pump

Once the pump has been taken out of the cardboard box, in order to operate you must:

- Dismantle the metal frame, by unscrewing 6 pieces of M8 nuts, key No 13.
- Dismantle the pump from the wooden panel, by unscrewing 4 pieces of M8 nuts, key No 13.

When **lifting and/or moving** the pump you must make use of the crane eyes provided on the pump for this purpose; also use the recommended type of lifting device.

3.2 Installation

- The standard pump is not suited for installation in explosion hazard areas. When planning such an application please contact us first.

The pump must be set up on a flat, horizontal surface. The ambient temperature should not exceed +40 °C and not drop below +12 °C. The site chosen should allow adequate air circulation to cool the pump.

Caution!

- If you wish to firmly install the pump in place, insert bolts or similar connecting elements through the bore holes in the feet. Use rubber feets to act as vibration absorbers**. RSVP 15** pumps are equipped with rubber feet.
- When installing **RSVP** pump, make sure that the connections and controls are readily accessible.
- Max. tilt allowed, for the pump with possibly fitted standard accessories is 5° from the vertical. The site chosen should allow adequate air circulation to cool the pump.
- If the pump is installed on a tilt surface, the indicated oil level will be altered, and this has to be taken into consideration.

3.3 Connection to the System

Before connecting the pump, remove the shipping seals from the exhaust (1/4) and the intake (1/15) flanges.

Caution!

- Retain the shipping seals in case you need to store the pump in the future.

Connect the intake and exhaust pipes, using centering ring, “O” ring and a clamp for each ring. Placing of a filter at the intake pipe is recommendable.

Caution!

- The intake line must be clean. Deposits in the intake line may outgas and adversely affect the vacuum. The connecting flanges must be clean and undamaged.
- The cross-section of the intake and exhaust lines should be at least the same size as the connection ports of the pump. If the intake line is too narrow, it reduces the pumping speed. If the exhaust line is too narrow, overpressures may occur in the pump; this might damage the shaft seals and cause oil leaks.

The maximum pressure in the oil case must not exceed 1.5 bar. When pumping oil vapours, it is advisable to install filters /condensate traps/ on the exhaust side. Install the exhaust line with a downward slope (lower than the pump) so as to prevent condensate from flowing back into the pump. If this is not possible, insert a condensate trap.

In order to reduce the emission of oil vapours we recommend the installation of an additional exhaust filter.

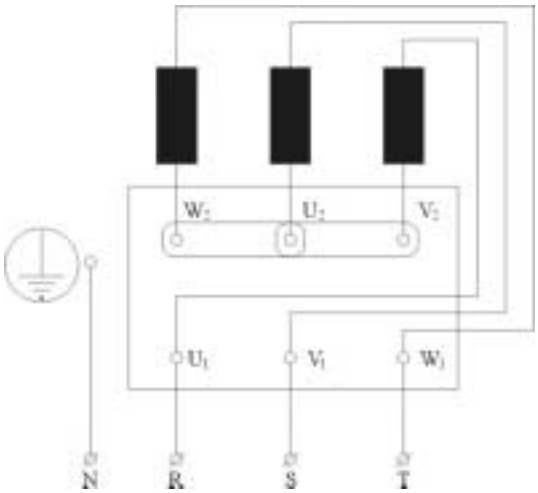
- Never operate the pump with a sealed exhaust line. There is the danger of injury.
- Before starting any work on the pump, the personnel must be informed about possible dangers first. All safety regulations must be observed.

3.4 Electrical Connection

- Before beginning with any work on the wiring, ensure that mains supply for the pump is off.
- Electrical connections must be done by a qualified electrician in accordance with the acting guidelines.

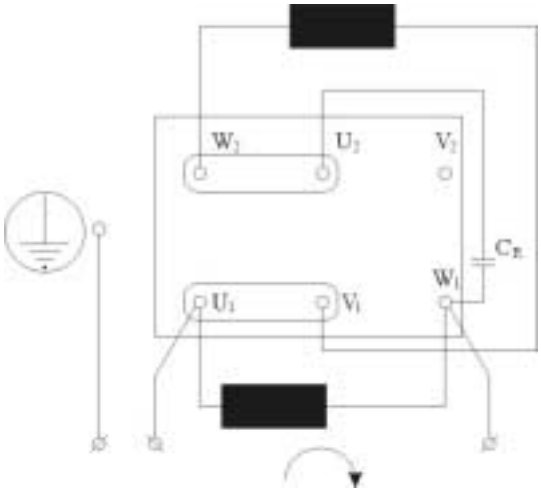
RSVP pumps are supplied without accessories for electrical connection. They must be connected via the appropriate cable, and a suitable motor protection switch. Set the switch in accordance with the rating on the motor nameplate.

Fig. 7 Connection diagram for a 3-phase motor.



- The pump is connected through a 4-wire cable, three wires are for the phase leads (R, S, and T) and the fourth is the Neutral lead, connected to the bolt, marked with sign

Fig. 8 Connection diagram of a single-phase motor.



- Refers only to RSVP 15 pumps with a single-phase motor.
- The pump is connected through a 3-wire cable, two leads are connected to the terminals of the box, and the third – protective lead is connected to the bolt, marked with sign

Caution!

- After connecting the motor and after every time you alter the wiring, check the direction of rotation. To do so, briefly switch on the motor and check whether a suitable cover (e. g. a blank flange) is sucked on at the intake port. If not, interchange the two phase leads of the connection. Observe the direction arrow on the coupling housing!

3.5 Start-up

Caution!

- Each time before starting up check the oil level.

For pumps with 3-phase motors, check the direction of rotation before starting the pump for the first time and after each change in the electrical connection.

On initial start-up, after prolonged idle periods or after an oil change, the specified ultimate pressure cannot be attained until the oil is degassed. This can be done by running the pump for approx. 30 min. with the intake line closed and the gas ballast valve (1/18) open.

- Before starting the pump ensure that the pump and the fitted accessories meet the requirements of your application and that safe operation can be guaranteed.
- Avoid exposure of any part of the body to the vacuum. There is the danger of injury. Never operate the pump with an open intake port. Vacuum connections as well as oil-fill and oil-drain openings **must never be opened** during operation.
- The safety regulations which apply to the application in each case must be observed. This applies to installation, operation and during maintenance (service) as well as waste disposal and transportation.
- The standard pumps are not suited for pumping of hazardous gases or vapours.

3.5.1 Application Areas

- The pump **is not** suitable for pumping of:
  - ignitable and explosive gases or vapours
  - oxidants
  - pyrophorous gases.

Caution!

- The pumps are not suitable for pumping of liquids or very dusty media. Suitable protective devices must be installed.

3.6 Operation

RSVP pumps can pump condensable gases and vapours within the acceptable tolerance, provided that the gas ballast valve (1/18) is open and the pump has attained its operating temperature.

3.6.1. Pumping of Non-Condensable Gases

If the process contains mainly permanent gases, the pump may be operated without gas ballast, provided that the saturation vapour pressure at operating temperature is not exceeded during compression.

If the composition of the gases to be pumped is not known and if condensation in the pump cannot be ruled out, run the pump with the gas ballast valve open.

3.6.2. Pumping of Condensable Gases and Vapours

With the gas ballast valve open and at operating temperature, **RSVP** pumps can pump pure water vapour up to the water vapour tolerance. If the vapour pressure increases above the permissible level, the water vapour will condense in the oil of the pump.

Caution!

- During pumping, vapours may dissolve in the oil. This changes the oil properties and thus there is a risk of corrosion in the pump. Therefore, don't switch off the pump immediately after completion of the process. Instead, allow the pump to continue operating with the gas ballast valve open and the intake line closed until the oil is free of condensed vapours.

We strongly recommend operating the pump in this mode for about 30 minutes after completion of the process.

In cyclic operation, the **RSVP** pumps should not be switched off during the intervals between the individual working phases (power consumption is minimal when the pump is operating at ultimate pressure), but should continue to run with gas ballast valve open and intake port closed (if possible via a valve).

Once all vapours have been pumped off from a process (e.g. during drying), the gas ballast valve can be closed to improve the attainable ultimate pressure.

3.6.3 Operating Temperature

Proper operation of the **RSVP** is ensured in the ambient temperature range between **12 °C to 40 °C.**

- At normal operation, the surface temperature of the oil case may exceed 80 °C, depending on the load.
- **There is the danger of receiving burns.**

3.7 Switching Off / Shutdown

Under normal circumstances, all that you need do is to electrically switch off the pump. No further measures will be required.

Caution!

- When pumping condensable media let the pump continue to operate with the gas ballast valve open and the intake line closed before switching off.
- When pumping aggressive or corrosive media, let the pump continue to operate even during long non-working intervals (e.g. overnight) with the intake line closed and the gas ballast valve open. This avoids corrosion during idle periods.

If the pump is to be shutdown for an extended period after pumping aggressive or corrosive media or if the pump has to be stored, proceed as follows:

- When pumping harmful substances, take adequate safety precautions:

.

Drain the oil.

Add clean oil until the oil-level is at the “min” mark and let the pump operate for some time. Then drain the oil and add clean oil until the oil level is at the “max.” mark (as shown in Fig.9).

Seal the connection ports. Special conservation or anticorrosion oils aren’t necessary.

Caution!

- Please also take note of the information given in Section 4.4 (storage and storage conditions).

3.7.1 Shut-Down Through Monitoring Components

- When the pump has been switched off due to overheating sensed by the motor coil protector, the pump must only be started **manually** after the pump has cooled down to the ambient temperature and after having removed the cause first.

3.7.2 Failure of the Control System or the Mains Power

- In order to prevent the pump from running up unexpectedly after a mains power failure, the pump must be integrated in the control system in such a way that the pump can only be switched on again manually.

4. Maintenance

- Disconnect the electrical connections before disassembling the pump. Make absolutely sure that the pump cannot be accidentally started.
- If the pump has pumped harmful substances, ascertain the nature of hazard and take adequate safety measures. Observe all safety regulations.

If you send a pump for repair please observe the information provided in Section 6.

- When disposing of used oil, you must observe the applicable environmental regulations!

Due to the design concept, **RSVP** pumps require very little maintenance when operated under normal conditions. The work required is described in the sections below.

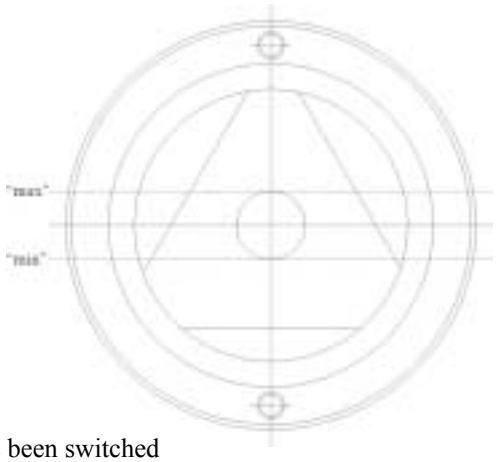
Caution!

- All work must be carried out by suitably trained personnel. Maintenance or repairs carried out incorrectly will affect the life and performance of the pump and may cause problems when filing warranty claims.
- If the pump has been used in ambient air which is much contaminated, make sure that the air circulation and the gas ballast valve are not adversely affected.
- When the **RSVP** has been pumping corrosive media we recommend that possibly planned maintenance work be carried out immediately in order to prevent corrosion of the pump while it is at standstill.

4.1 Checking the Oil Level

During operation of the **RSVP** the oil level must always remain between the marks “min” and “max” at the oil-level glass. The amount of oil must be checked and topped up as required.

Fig. 9 An oil-level indicator scheme, RSVP pumps



Caution!	• Fill in oil only after the pump has been switched off.

4.1.1 Checking the Condition of N 62, HE 200 Oil, Shell Corena V

a) Visual check

Normally the oil is clear and transparent. If the oil darkens, it should be changed.

b) Chemical check

The neutralisation number of the oil is determined according to DIN 51558. If it exceeds 2, the oil should be changed.

c) Viscosity check

If the viscosity of oil at 25 °C exceeds 300 mPas, the oil should be changed.

If gases or liquids dissolved in the oil result in a deterioration of the ultimate pressure, the oil can be degassed by allowing the pump to run for approx. 30 min. with the intake port closed and the gas ballast valve open.

When wanting to check the oil, switch off the pump first and drain out from the warm pump the required amount of oil from the oil drain plug (1/10) into a beaker or similar.

4.2 Oil Change

For proper operation of the pump, it is essential that the pump has an adequate supply of the correct and clean oil at all times.

The oil must be changed when it looks dirty or if it appears chemically or mechanically worn out.

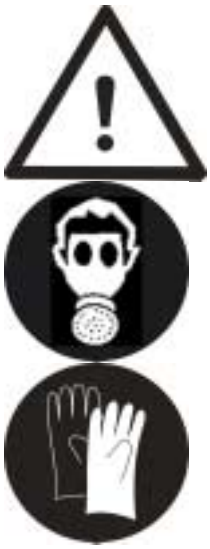
The oil should be changed at every 2,000 operating hours or after one year. At high intake pressures and intake temperatures and/or when pumping condensable gases or vapours, the oil will have to be changed more frequently.

Further oil changes should be made before and after long-term storage of the pump.

If the oil becomes contaminated too quickly, install a dust filter and/or oil filter.

Required tool: Allen key size 8.

Caution!



- Only change the oil after the pump has been switched off and while the pump is still warm.
- If there is the danger that the operating agent may present a hazard because of the media, which have been pumped, you must ensure that all necessary safety precautions are taken.

Remove the oil-drain plug and let the used oil drain into a suitable container. When the flow of oil slows down, screw the oil-drain plug back in, briefly switch on the pump (max. 10 s) and then switch it off again.

Remove the oil-drain plug once more and drain out the remaining oil. Screw the oil-drain plug back in (check the gasket and reinstall a new one if necessary).

Remove the oil-fill plug and fill in with fresh oil. Screw the oil-fill plug back in.

The quantity of oil, needed for your pump model, can be checked at the Technical Specifications (section 1.4)

4.3 Cleaning the Dirt Trap

A wire-mesh sieve is located in the intake port of the pump to act as a dirt trap for coarse particles. It should be kept clean. For this purpose, remove the dirt trap from the intake port and rinse it in a suitable vessel with solvent. If the dirt trap is defective, replace it with a new one.

Caution!

- The cleaning intervals depend on the application. If the pump is exposed to large amounts of abrasive materials, a dust filter should be fitted into the intake line.

4.4 Storing the Pump

Caution!

- The pump should be stored in a dry place preferably within the operating temperature (12 °C - 40 °C). Before the pump is shelved it must be properly disconnected from the vacuum system, purged with dry nitrogen and the oil should be changed too. The inlets and outlets of the pump must be sealed with the shipping seals, which are provided upon delivery.
- The gas ballast switch must be set to the “closed” position.

When a pump is put into operation after it has been shelved for over one year, standard maintenance should be run on the pump and the oil should also be exchanged (see “Operation” and “Maintenance”).

4.5 Maintenance plan

- **Maintenance before switching on the system**

  - Check the oil level, change the oil if required. Oil: N 62 or special and alternative oils. Refill: only after the pump has been switched off.
  - Check the quality of the oil, change the oil if required. **Visually:** normally light and transparent, oil change is required when discolorations increase.

- **Daily maintenance**
  - Operate the pump for at least 30 minutes with gas ballast. Condensed water is thus removed from the oil.
  - Check the oil level, change the oil if required. Oil: N 62 or special and alternative oils. Refill: only after the pump has been switched off.
  - Check the quality of the oil, change the oil if required. **Visually:** normally light and transparent, oil change is required when discolorations increase.

- **6 monthly maintenance**
  - Check the oil level, change the oil if required:

    Chemically: according to DIN-51558;
    Mechanically: when dynamic viscosity at 25 °C exceeds 300 mPas; then an oil change will be required.

  - Clean the dirt trap in the intake port, change it as required. Use suitable cleaning agent and compressed air. Observe the safety regulations when using cleaning agents.

Service Maintenance of the Pump
This kind of maintenance is done only in the service, specified in the Warranty Card!

- **Annual maintenance (at the client's premises)**
  - Check of the teeth edges on the coupling element for any damages;
  - Oil change;
  - Cleaning of the oil level glass;
  - Checking of the fan of the pump and the motor as well as the cooling fins on the motor for deposits
  - Measurement of pump parameters;

- **Maintenance at every two years (in service)**
  - Complete disassembly and cleaning of the pump components;
  - Checking of the individual components;
  - Oil change;
  - Change of all gaskets and seals;
  - Visual check and measurement of the vanes;
  - Measurement of pump parameters and functional check;

5. Troubleshooting

Fault	Possible cause	Remedy	Section*
Pump does not start	Wiring is malfunctioning. Motor protection switch incorrectly set (3-phase motors only). Operating voltage does not match motor. Motor is malfunctioning. Oil temperature is below 12 °C. Oil is too viscous.	Check and repair wiring. Set motor protection switch properly. Replace the fault element. Replace the motor. Heat the pump and pump oil or use different oil. Change the oil.	- 3.4 service service 3.6.3/4.2 4.2
Pump does not reach ultimate pressure	Measuring technique or gauge is unsuitable. External leak ** Exhaust valve is malfunctioning. Oil is unsuitable. Intake line is dirty. Pump is too small.	Use correct measuring technique and gauge. Repair the pump. Repair the valve. Change the oil (degas it, if necessary). Clean vacuum lines. Check the process data; replace the pump, if necessary.	service service service 4.2 - -
Pumping speed is too low	Dirt trap in the intake port is clogged. Exhaust filter is clogged. Connecting lines are too narrow or too long.	Clean the dirt trap; Exchange the filter element. Use adequately wide and short connecting lines.	4.3 - 3.3
After switching off pump under vacuum, pressure in system rises too fast.	System has a leak. Anti-suckback valve is malfunctioning.	Check the system. Repair the valve.	- service
Pump gets hotter than usually observed.	Cooling air supply is obstructed. Ambient temperature is too high. Process gas is too hot. Oil cycle is obstructed. Exhaust filter or exhaust line is obstructed. Exhaust valve is malfunctioning. Pump module is worn out.	Set pump up correctly. Set the vacuum system correctly. Clean or repair the oil lines and channels. Replace the exhaust filter, clean the exhaust line. Repair the valve. Replace the pump module.	3.2 4.2 service - service service
Oil in the intake line or in vacuum vessel.	Oil comes from the vacuum system. Anti-suckback valve is damaged. Sealing surfaces of anti-suckback valve are damaged or dirty.	Check the vacuum system. Clean or repair the valve. Clean or repair the intake port and the anti-suckback valve.	- service service
Oil is turbid.	Condensation.	Degas the oil or change the oil and clean the pump.	2.5.2/4.2
Pump is excessively noisy.	Oil level is much too low (oil is no longer visible). Intake pressure is too high. Coupling element is worn. Vanes or bearings are damaged.	Add oil. Lower the intake pressure. Install new coupling element. Repair pump.	4.2 - 3.6 service
Oil-level falls too fast	Oil-leak from the vacuum pump. Pump works too long at high intake pressure.	Repair the leak. Install an oil-trap at the exhaust line and/or optimize the vacuum system.	- -

* Repair information: refer to the Section in the Operation Instruction stated here.
** Bubble test: the warm pump with degassed oil is running without gas ballast and the intake blanked off. The exhaust line is led in to a vessel with water. If an evenly spaced line of bubbles appears, then the pump has an external leak.

6. Repair in Authorized Service

When you have purchased a pump, you have also received a Warranty Card, completed and sealed by the Seller. It indicates the corresponding service, which will be serving your pump in case of warranty defects and maintenance, in accordance with the plan in section 4.5.

If a pump is returned to a service for maintenance, indicate whether the pump is free of substances damaging to health or whether it is contaminated. If it is contaminated also indicate the nature of the hazard. For this you must use a form which has been prepared by us. Please make a copy and fill in the form - ***"Declaration of Contamination of Vacuum Pumps".*** This "Declaration of Contamination" is required for the protection of our personnel. Any pump, sent to a service without a "Declaration of Contamination" will be returned to the sender's address, on his account.

- The pump must be packed in such a way, that it will not be damaged during shipping and so that any contaminants are not released from the package.

7. Spare Parts

In order to ensure normal operation of the vacuum pump and to avoid any hazards, relating to its exploitation, the manufacturer recommends repair of the pump and replacement of spare parts in an authorized service only.

The authorized services have all necessary spare parts on stock and are in position to provide fast and competent assistance for the service of the product.

- In case a repair or a service maintenance is needed, please observe the instructions for transportation, maintenance and repair, pointed in sections 1.3, 4.5 and 6.

8. Warranty Conditions

We – "Vacuum El System" Ltd., herewith declare that the hereby product is made of quality materials and guarantee normal pump operation, provided that all instructions in the hereby User's Guide are observed.

Warranty period is 24 months from date of purchase.
Change of mechanical elements, including but not limited with oil, shaft seals, filters and others, made with concern to normal service maintenance, are not subject of this warranty.

This warranty will be void in case of pumps, damaged by improper transportation or non-observance of instructions for operations and storage (e.g. operated at high ambient temperature, polluted media, corrosive or explosive liquids and gases) as well as in cases, when an attempt from third persons or companies has been made to repair the malfunction.

Limitation of liabilities: Liabilities are limited to repair and renovation or replacement of the pump, at the choice of "Vacuum El System".

9. Clients Service

Each time, when you address us, in order to get service, maintenance or advise, please provide information about the model, the pump serial number and the date of purchase. Please, refer to the seller's invoice or the information plate, attached to the pump.

VACUUM EL SYSTEM	Test Report No 1/20.01.2004	DIN EN ISO 9001:2000

1. Product:

Name: **RSVP 15**

ID No: **000595**

2. Technical parameters:

Parameter	Measure	Requirement	Measured
Ultimate operational pressure without gas-ballast	mbar	$\leq 4x10^{-2}$	**$3,8x10^{-2}$**
Ultimate operational pressure with gas-ballast	mbar	$\leq 8x10^{-1}$	**$7,5x\ 10^{-1}$**
Pump operational temperature	^{0}C	≤ 80	**78**
At ambient temperature	^{0}C	12 ~ 40	**15 ~ 22**

Test technician: ….. …….. **Metrologist: ……..**

/St. Stoilov/ **/T. Hristov/**

CE

VACUUM EL SYSTEM

EC Declaration of Conformity

(According to Machinery Directive 98/37 EC, Annex II A)

Manufacturer: Vacuum El System Ltd.
Address: 1, Yambolen Str., 8600 Yambol, Bulgaria

Authorised Representative: Vacuum El Sys Kft.
Address: 2040 Budaörs, Fodros u. 66A, Hungary

We herewith declare that the following products complies with the basic safety and health requirements of the EC Directive by design, type and versions which are brought into circulation by us. In case of alteration of any product, not agreed upon by us, this declaration will be void.

Description of the products: Rotary vane pump
Single and two-stage

Type: RTVP	RTVP 16 A; RTVP 30 A; RTVP 60 A; RTVP 16 AC; RTVP 30 AC; RTVP 60 AC
Type: RSVP	**RSVP 15; RSVP 30; RSVP 60; RSVP 90**
Type: RV	RV 15; RV 30; RV 60; RV 90

Applicable EU Directives: Machine Directive (98/37/EC)
Low Voltage Directive (73/23 EEC)

Applied harmonised standards:
EN 292-1:1991
EN 292-2:1991
EN 1012-2 :1996
Pr.EN ISO 2151:2004
EN 60 204:1993

Yambol, January 5, 2004

.....
Georgi Komitov, Director
Vacuum El System Ltd.

Budaörs, January 5, 2004

.....
Gabor Kirov, Director
Vacuum El Sys Kft.

Declaration of Contamination of Vacuum Pumps

The repair and/or service of vacuum pumps will only be carried out if a correctly completed declaration has been submitted. The manufacturer or the authorized service has the right to refuse to accept any pump without a declaration. This declaration can only be completed and signed by authorized personnel.

Vacuum pumps, which have been contaminated by biologically active or explosive substances, will not be accepted without written evidence of decontamination.

1. Description of the vacuum pump:

- model / type:
- serial No:
- invoice No:

2. Reason for return of the vacuum pump:

_____
_____
_____

3. Condition of the vacuum pump:

- has the pump been used? yes no
- what type of pump oil/liquid has been used? _____
- is the pump free from potentially harmful substances?
  yes (go to Section 5)
  no (go to Section 4)

4. Process related contamination of vacuum pump:

- toxic	yes	no
- corrosive	yes	no
- explosive	yes	no
- biological hazard	yes	no
- radioactive	yes	no
- other harmful substances	yes	no

Please, list all substances, gases and by-products, which may have come into contact with the pump.

Trade name, Product name, Manufacturer	Chemical name (or symbol)	Dangerous material class	Measures if spillage	First aid in case of human contact
1.				
2.				
3.				
4.				

5. Declaration

Undersigned _____ hereby declare that the information supplied on this form is complete and accurate. The dispatch of the contaminated vacuum pump will be in accordance with the appropriate regulations covering packaging, transportation and labeling of dangerous substances.

Name of organization or company:
_____
Address: _____; Post code: _____
Tel.: _____; Fax: _____
Name: _____
Job title: _____

Date: _____ Legally binding signature: _____
(company stamp)

MANUFACTURER:

VACUUM EL SYSTEM LTD.

1, Yambolen Str.

8600 Yambol

Bulgaria

www.vacuumsys.com